



Happy Valentine's Day!!!

OLLI Spring 2023 Semester

Battlefield Medicine

SESSION 3
FEBRUARY 14TH, 2023

Revolutionary War and Civil War

Néstor A. Ramírez, MD, MPH

Plan for the Course

- Session 1: Ancient history, Rome, Greece.
- Session 2: Middle Ages, weapons & injuries.
- **Session 3: US Revolutionary & Civil Wars.**
- Session 4: World War I.
- Session 5: World War II.
- Session 6: Korea, Vietnam.
- Session 7: 20th & 21st Century Regional wars.
- Session 8: Peek into future, Nuclear War?

Plan for Session 3

- Review of Humors Theory
- Historical Background American Revolution
- Medical Care in Colonial America
- Weapons & Injuries
- Historical Background Civil War
- Major Letterman and Battlefield Medicine
- Weapons & Amumintions, Minié ball
- Ambulance Service
- Women in Civil War

HISTORICAL BACKGROUND

Historical Background

- Colonial medicine was based on the Grecian theory of Humors and their matching organs.
- Good health requires them to remain in balance, so an excess or deficiency of any one would lead to disease:
 - Excess was relieved by bleeding, purging, or sweating.
 - Deficit was made up by rest, diets, and medicinals.

Roots of Grecian Medicine



Four Basic Body Humors:

Blood

Yellow bile

Black bile

Phlegm

Humors and their Correlations

HUMOR	ELEMENT	QUALITIES	AGE	ORGAN	TEMPERAMENT	SEASON
Blood	Air	Moist and Warm	Infancy	Liver	Sanguine	Spring
Yellow Bile	Fire	Warm and Dry	Youth	Gallbladder	Choleric	Summer
Black Bile	Earth	Dry and Cold	Adulthood	Spleen	Melancholic	Autumn
Phlegm	Water	Cold and moist	Old Age	Brain/lung	Phlegmatic	Winter

Ramírez 2019

Revolutionary War

(Medical Care)

- In the late 18th century, many doctors still followed Galen's 1,000-year-old ideas.
- Galen believed that the body had 4 humors: blood, phlegm, yellow bile, and black bile.
- Good health required a balance of the humors and illness resulted from their imbalance.

Historical Background

- The ancient belief in the humors and their balance predominated until the 16th Century.
- Doctors started to learn better diagnostic and therapeutic modalities.
- Galen's doctrines were mostly abandoned.

Historical Background

- Since before the 14th Century, medicine and surgery had become divorced.
- Surgery was beneath a doctor's activity, and surgery was the lowest of the lowest.
- This task was relegated to largely illiterate, itinerant and poorly trained practitioners.

Historical Background

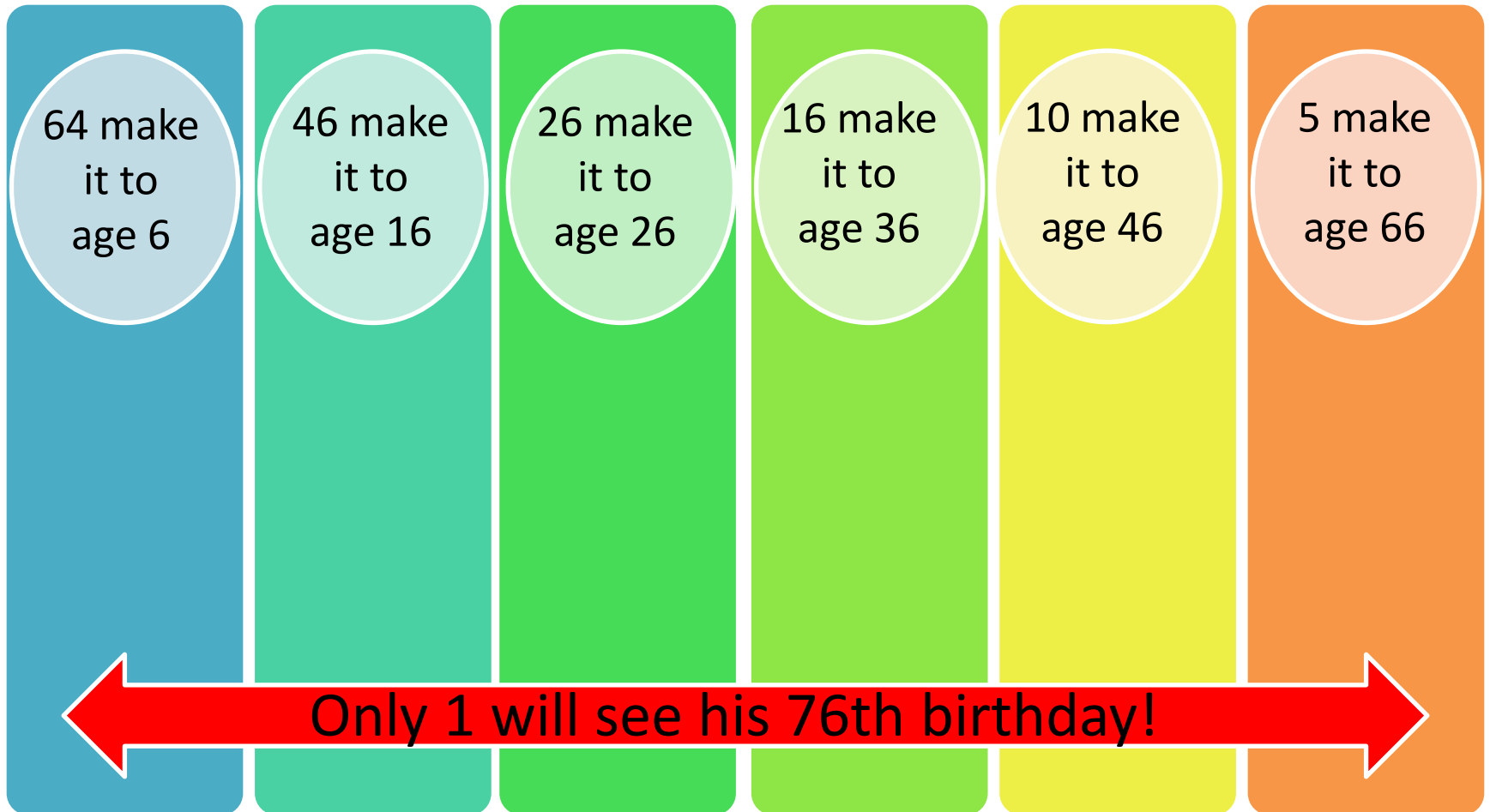
- Barber-surgeons did not understand infection and were not interested in sanitation.
- Their work consisted mainly of removing sharp objects and dressing wounds.
- Often, what they did to wounds was worse than leaving them alone!

Historical Background

- In the 14th Century, physicians rediscovered that some diseases could be transmitted from person to person.
- Still, they did not know **how** that happened, until Pasteur's discoveries in the mid 1860's.
- The 15th Century saw an increase in the use of gunpowder weapons and their new injuries.

Life Expectancy in 1750's

(based on 100 people)



REVOLUTIONARY WAR

1775-1783

Revolutionary War (1775 – 1783)



Revolutionary War

(Medical Care)

- On the frontier, people simply declared themselves physicians and set up practice.
- Smaller communities were served medically by clergymen or by better educated farmers.
- People believed that a trained physician could diagnose any mental or physical ailment by examining a patient's excrements.

Revolutionary War (Medical Care)

- The Colonial physician was a pillar of his society, he was a scholar and a gentleman, and his status was nearly that of the local minister.
- Physicians of the time were often judged by their oratory eloquence rather than by their successes.
- Most of the time, physicians seemed to help the ill hurry toward their maker, especially if blood letting and mercury were involved.

Revolutionary War

(Medical Care)

- In 1776, there were an estimated 3K physicians practicing in the colonies, mostly in urban areas.
- Fewer than 300 (10%) had a medical degree or a certificate from a formal apprenticeship.
- In some remote areas, surgery was performed by the local barber or butcher because they had the tools.

Revolutionary War (Medical Care)

- The Colonial physician's job was mainly providing support and comfort.
- On occasion, he would set a broken bone, or if there were multiple or open fractures, he could perform an amputation.
- He gave herbal preparations to his patients, often using bark from the *Cinchona* tree for fevers and malaria.

Revolutionary War (Medical Care)

- Most physicians frowned upon Empiricism, stuck to the rigors of their education and never questioned or tested.
- There were no organizations or affiliations to enforce any particular form of medicine at the time.
- Colonial physicians were free to choose therapies from herbalism, what they called Indian Medicine, or from their formal or informal medical education.

Revolutionary War (Medical Care)

- In the 17th century, the Humor theory was replaced by one of acidity, alkalinity, saltiness, tension, and relaxation.
- This was followed in the 18th century by a concept of Nerve Irritation which could alter the body fluids to cause illness.
- This led to a complex classification of diseases in which symptoms were matched to a text in a book to achieve a diagnosis.

Revolutionary War

(Medical Care)

- John Brown, a Scotsman, proposed the Unity theory that good health depended upon a proper balance of nerve stimulation (excitation) to the muscles, and blood vessel response.
- Excessive stimulation triggered muscular spasm, which led to disease; too little stimulation caused weakness or atony.
- This *Brunonian* theory prevailed at the time of the Revolution.

Dr. Benjamin Rush

(1746 – 1813)

- His inflexible method of treatment, called for a low diet, vigorous purges with calomel and jalap, and bleeding until the patient fainted.
- He did not hesitate to remove one quart of blood at a time, or to repeat this 2 or 3 times within a 2-3-day period.
- In time, Rush’s system and treatment became “the most popular and also the most dangerous system in America.”

Dr. Benjamin Rush

(1746 – 1813)

- He followed the theory of reducing the diagnosis of all illness to a single one.
- He discouraged the study of separate disease entities by blaming all disease on excessive tension which caused blood vessel disturbance.
- By 1793, he was openly contending that there was but one single disease in existence

Dr. Benjamin Rush

Treatment for Excessive Irritability

- Blood-letting, a quart every 48 hours.
- Blistering with plasters of flannel coated with caustics, (masked green beetle or Spanish fly).
- Poultices, applications of a hot paste of wheat bran or flaxseed, covered with flannel, relieves pain, swelling, or draining pus.
- The rectal administration of medicinals.

Revolutionary War (Medical Care)

- If tissue irritability was decreased, nervous energy needed to increase, so laudanum was used to lessen pain, but in large doses, it excited rather than relaxed.
- Purgatives, such as Glauber's salts, Plummer's pills, calomel, ipecac, rhubarb, castor oil, or Epsom salts were also prescribed.
- Nourishing broths and liquor were given to dilate the blood vessels

US GOVERNMENT MEDICAL DEPARTMENT

Revolutionary War

Medical Department Problems

- During the Revolution, the Continental Congress authorized one surgeon to serve in each regiment.
- Few of the regimental surgeons had any experience treating trauma, as there were only 2 medical schools in the US.
- Organization was minimal: regimental surgeons tended to work for their unit instead of seeing themselves as part of the Army's Hospital Department.

Revolutionary War

Medical Department Problems

- General Washington attempted to require surgeons and surgeon's mates to take examinations, but the Congress yielded to states' rights pressure.
- Nothing happened until much later, when the Congress established a screening board in 1782.

Revolutionary War

Medical Department Problems

- Congress approved both state-civilian and army-professional medical personnel as a method of checks and balances.
- This led to disputes between the Continental army and state militia medical men.
- At the top, disputes between the Director General and his rival, who was later court-martialed.

Revolutionary War

Medical Department Problems

- Some of the lower-level personnel were actually dishonest, and sold medical discharges.
- Gross inadequacy prevailed, which caused absence of medical supplies at the front.
- Small amounts of supplies were smuggled in from the West Indies, captured from the British, or the French managed to send a few shipments.

Revolutionary War

Medical Department Problems

- Jurisdictions overlapped, and a failure to establish lines of authority and responsibility dominated.
- State regiments had separate medical services, which were appointed by and under the control of the individual states.
- New Jersey, for example, in 1775 provided each of its battalions with at least one surgeon, and usually a surgeon's mate.

Revolutionary War

Medical Department Problems

- The Continental Congress never established a table of organization for the Medical Department.
- Congress was too preoccupied with other matters to pay enough attention to the needs of the medical department.
- Rivalries among top medical officers, politics in Congress, and corruption within the service often interfered with the operation of the department.

Revolutionary War

(Medical Care)

- The first medical society was formed in Boston in 1735.
- By the mid-1700's most colonies required a medical license of some form, but in many, the medical license was little more than a business tax with few, if any, enforceable standards.
- In Philadelphia, in 1751, Benjamin Franklin and others founded the 1st hospital in the colonies.

Revolutionary War

Medical Care

- Other diseases swept through eighteenth-century army camps, including diphtheria, dysentery, malaria, measles, and even scurvy.
- Surgery was primitive, and because microbes and sterilization were not yet understood, those who survived the shock and the bleeding risked lethal infections.

Revolutionary War

Medical Care

- Physicians had few effective medicines and often acted as their own apothecary, compounding medications of spices, herbs, flowers, bark, mercury, alcohol, or tar.
- Mercury was used to treat everything from syphilis to scabies, and opium elixir was sold to help babies sleep through the night.

Voltaire summed up the state of pharmacology:

“Doctors put drugs of which they know little, into bodies of which they know less, for diseases of which they know nothing at all.

Revolutionary War (Medical Care)

- Stimulants, like anise, pepper, cinnamon, cloves, dill, sage, ginger, horseradish, nutmeg, horehound, lavender, marjoram, and spearmint were also used in treatment.
- To stimulate saliva, and to counter intestinal irritation, mercury in oil was held in the mouth.
- Camphor or Dover's powder (opium and ipecac) were useful after intestinal symptoms were controlled;
- Rubefaciants and vesicants were also used to irritate and redden the skin.

Revolutionary War

(Medical Care)

- For bilious attacks, jaundice, or digestive problems: emetics, such as tartar emetic, ipecac, or warm water and honey.
- For muscular spasms: relaxation, opium, wine (quarts, even gallons daily) and ardent spirits were prescribed.
- To produce perspiration, sweat baths (borrowed from the Indians) were used.
- For kidney issues: milk, extracts of dandelions or juniper berries, or lemon juice were advocated as diuretics.

Revolutionary War

(Medical Care)

- For fever or ague: Epsom salt soaks or bark from the Cinchona tree.
- For dysentery: ipecac, blackberry wine, warm baths and vomits for dysentery.
- For respiratory issues: *elixir asthmaticum* (opium, honey, licorice, benzoic acid, camphor, oil of anise, potassium carbonate, and alcohol).

Revolutionary War

Regulations for Physicians

- Regimental surgeons are to be stationed with their militiamen when in a fort or on a defense line,
- In the heat of battle, amputation or any capital operation is best avoided, give emergency care only:
 - Stop bleeding with lint and compresses, ligatures, or tourniquet.
 - Remove foreign bodies from the wound.
 - Reduce fractured bones.
 - Apply dressings to wounds.

Revolutionary War

Regulations for Physicians

- If the dressings are too tight, blood flow is decreased and will increase inflammation and excite a fever; if the dressings are too loose, fresh bleeding may occur or set bones may displace.
- The wounded, most of them in insufficient clothing, were transported in springless wagons, and by sleds, carts, wheelbarrows, and on stretchers of coats or blankets.

Revolutionary War (Medical Care)

- Treatments included bleeding, purging, diuretics and laxatives, and placing heated cups on the back to form blisters and draw out the humors.
- It was this belief that led to the bleeding that hastened George Washington's death.
- Quite literally, the cure was worse than the disease.

Revolutionary War

(Medical Care)

- Inoculations against smallpox had been widespread in Africa and in Arab countries for many years.
- In the colonies, some clergy preached that it was against God's will and inoculation was denounced as barbarian.
- Cotton Mather and Benjamin Franklin supported it but it did not become widespread until George Washington ordered massive inoculation of all troops.

Questions ? (1)



Revolutionary War

Sanitation and Hygiene

- Disease and poor hygiene were the greatest foes faced by the army.
- John Adams reported that for every soldier killed in battle, ten died from disease.
- On July 25, 1775, the Continental Army Medical Corps was formed.

Revolutionary War

Sanitation and Hygiene

- Most soldiers had only a single set of clothes in which they also slept and almost never washed.
- Army camps were hot beds of flux (dysentery) and camp fever (typhus/typhoid).
- The survivors of camp fever were very debilitated and required almost constant care, so they seldom returned to duty.

Revolutionary War (Medical Care)

- On both sides in the American Revolution many more soldiers died from disease than in combat, and many more died from wounds than were killed outright.
- It wasn't so much that medical science had advanced to such a degree as to reverse this situation as it was that military science had advanced even further.

Revolutionary War (Medical Care)

- Armies provided a surgeon and surgeon's mates who provided battlefield urgent care at the regimental level.
- Other staff was charged with operating fixed and field hospitals, and included trained medical personnel, civilian nurses, orderlies, cooks, and support staff.
- Most medical care came after the shooting stopped.
- The regiment's quartermaster searched for the wounded using the fifers and drummers as stretcher bearers.

Revolutionary War Injuries

- During the Revolutionary War, a wounded (bleeding) soldier about to undergo surgery, was first bled.
- Surgeons of who did not know that people could die from loss of blood had a very low success rate.
- The most common type of injury was a gunshot wound, and surgeons were urged not to probe deeply for it.
- “Let it remain, if it can’t be easily located,” was the order.

Revolutionary War

Injuries

- If battle injuries involved compound fractures, and the question of amputation arose, many surgeons favored immediate amputation.
- Some preferred to postpone amputation until it was obvious that it would be required.
- Compound fractures treated in crowded hospitals, were frequently followed by infection, making amputation eventually necessary, but amputation did not necessarily save the patient's life.
- The mortality rate was often 45 to 65 % when the leg was removed at mid-thigh, but some surgeons had less mortality.

Revolutionary War

Weapons

- The flintlock was the first line of offense or defense in the arsenal of revolutionary war weapons of both armies.
- The British relied on their “Brown Bess” which often found its way into American hands.
- Its lack of accuracy was offset by its use in line formations firing simultaneous, rotating volleys, or become a wall of bayonets, attached to the gun barrel.
- Survival was purely a matter of luck!

Revolutionary War

Weapons

- Later on, the Americans used the French Charleville musket, no more accurate than the British weapon, but more accessible when supplied by their French ally.
- The weapon was muzzle-loaded with a metal ball, $\frac{1}{2}$ inch in diameter, 1 ounce in weight, contained in a paper cartridge.
- The powder was stored in a horn shaped object.
- When the ball struck the human body at a high velocity it tore a large hole in the victim.



Revolutionary War

Injuries

- There were many types of battle wounds in the Revolutionary War, none of which were easy to treat.
- One of the worst was when the victim was struck by an arrow.
- Most combatants carried muskets or rifles, but bows and arrows were used, often along with a musket, by Native Americans.
- Medical texts during the Revolutionary War period are silent regarding the treatment for arrow wounds.

Revolutionary War

Injuries

Physical

- Blows to the head
- Cuts
- Puncture wounds
- Arrows/bullets lodged in limbs
- Infections and other illness
- Malnutrition

Mental

- Insanity
- Depression
- Shell shock
- Paranoia

Revolutionary War

Treatments

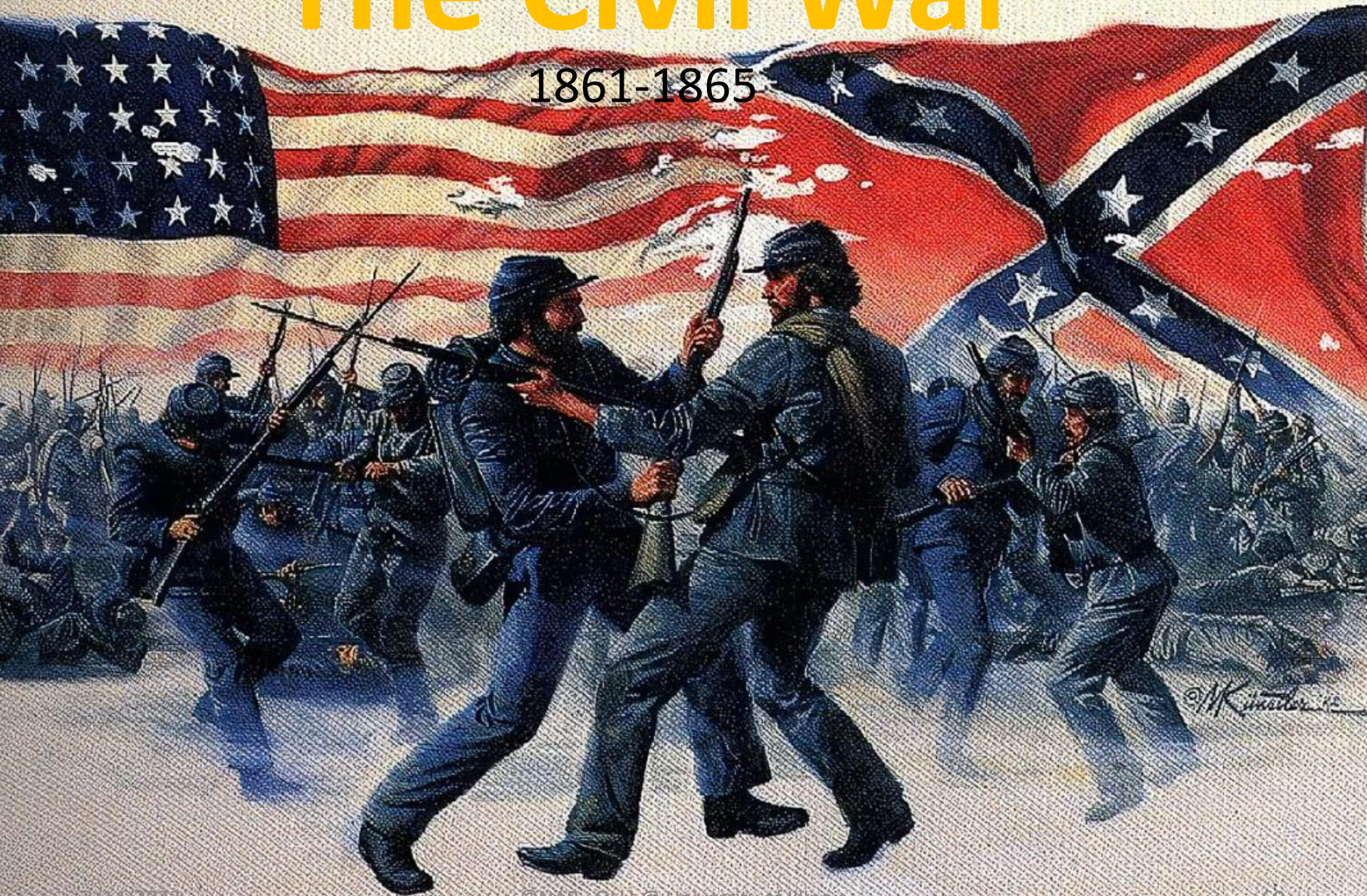
- Alcohol/opium for pain
- Bleeding for “unbalanced blood”
- Herbal teas, poultices
- Amputations of arms/legs
- Healing power of nature

Summary

- Medical care was ignorant, inefficient and mostly removed from battlefield.
- Army Medical Department was incompetent, disorganized and powerless vis-à-vis states.
- Amputations were frequent.
- Pain relief relied on opium and alcohol.

The Civil War

1861-1865



Historical Background

- The curriculum in even the best Medical schools lasted two years, with the 2nd year being merely a repeat of the first.
- Since the quality of military surgeons differed considerably, in 1861 the U.S. Army Medical Department began giving exams to weed out unqualified physicians, and the Confederacy soon took similar steps.
- Many military surgeons considered it was **not** their duty to keep the men healthy to fight, maintaining proper sanitation, food, and shelter.

Historical Background

- When the Civil War began in April 1861, medicine was approaching what Surgeon General William Hammond called "the end of the medical Middle Ages."
- In Europe, the work of Koch and Pasteur was just beginning but American physicians had little knowledge of the cause and prevention of disease and infection.
- The Army Medical Department, which was responsible for the care of the sick and wounded in the North, was unprepared.
- The staff of 90 doctors was experienced in dealing with the health problems of small military outposts, but had no idea of how to deal with large scale medical and logistical problems.

Historical Background

- During combat, the medical team set up a field hospital close to the action.
- The assistant surgeon manned an aid station to treat wounded at the edge of the battlefield until they could be removed to the surgeon's care at the field hospital.
- In late 1861 the Union army began consolidating regimental hospitals into division and corps hospitals to handle larger troops more efficiently.
- Prior to that wounded were brought from the field either by comrades or by musicians from the regiment's band, if it had one.

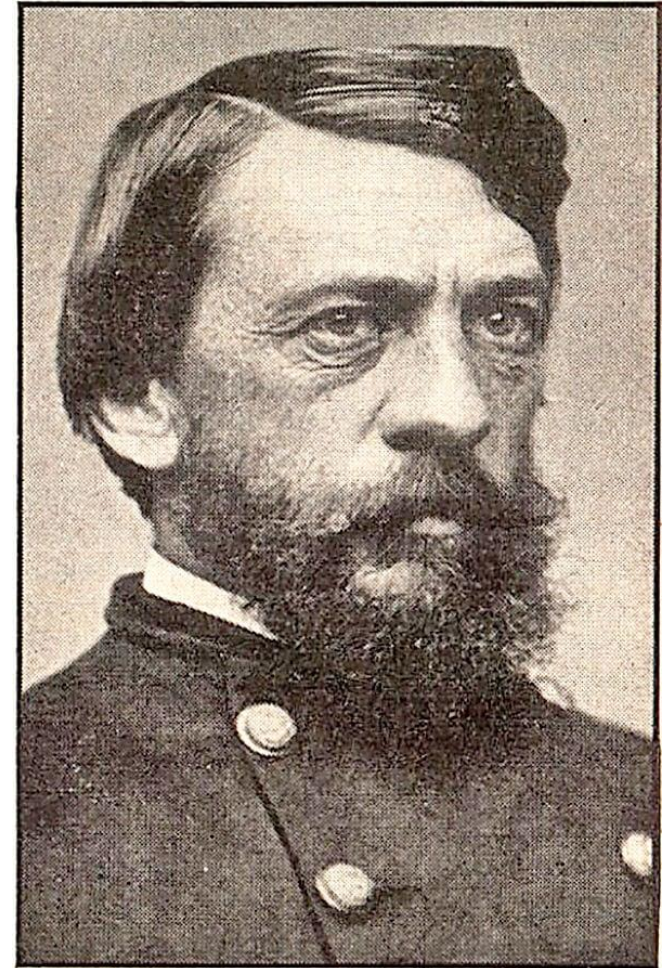
Historical Background

- When the Civil War started, doctors still did not understand the need for cleanliness in regular military life or in surgery.
- Ambulances or other evacuation systems were absent from both Armies of the Civil War.
- Medicine as a discipline offered little to the sick and injured, and caring for them diverted staff and supplies away from those fit to fight.

Maj. Jonathan Letterman

(1824-1872)

- Upon the advice Army Surgeon General W. Hammond, Gen. G. McClellan appointed him as Chief Surgeon of the Army of the Potomac.
- He proposed and instituted serious reforms to the way the US Army treated its wounded.
- He also made new rules regarding hygiene and sanitation of soldiers and of hospitals.



Maj. Jonathan Letterman

(1824-1872)

- Letterman receives an Army of 103,000 troops with 29% listed as ill and no longer able to fight.
- Gen. McClellan and his staff know that the sick lists, even as long as they are, denote only a small part of the problem.
- Riddled with sickness, the Army of the Potomac is an ineffective fighting force.
- Gen. McClellan's order to Letterman; cultivate a strategy to solve this problem and return his army to fighting strength.

Maj. Jonathan Letterman

(1824-1872)

- Originated methods for medical organization in armies (battlefield medical management).
- In the United States, Letterman is known today as the "Father of Battlefield Medicine".
- His system enabled thousands of wounded to be recovered and treated during the Civil War.

Civil War

Sanitation and Hygiene

- For every soldier who died in battle, two died of disease.
- Intestinal complaints such as dysentery and diarrhea claimed the lives of more men than did battle wounds.
- Soldiers were exposed to malaria when in damp areas conducive to breeding mosquitos.
- Civil War soldier also faced outbreaks of measles, smallpox, malaria, pneumonia, or “army itch”.

Army Itch

- Chronic, severely pruritic dermatosis which appeared among soldiers on both sides and in some civilians early in the Civil War.
- Called “army itch” by Northern soldiers and “camp itch” by the Confederate troops.
- Became epidemic in the Potomac Valley of Maryland in 1862 and in Virginia in 1864.
- Many cases were successfully treated with scabicides, but the disease had a reputation for intractability.

Army Itch

- After the war, many civilian cases were traceable to contact with returning soldiers, but post-war outbreaks were short-lived and it disappeared by late 1867.
- Origin of army itch eluded medical observers of the time.
- It's possible that army itch was epidemic scabies, but the diagnosis was frequently confounded by coexisting pediculosis, prurigo, and other pruritic dermatoses.



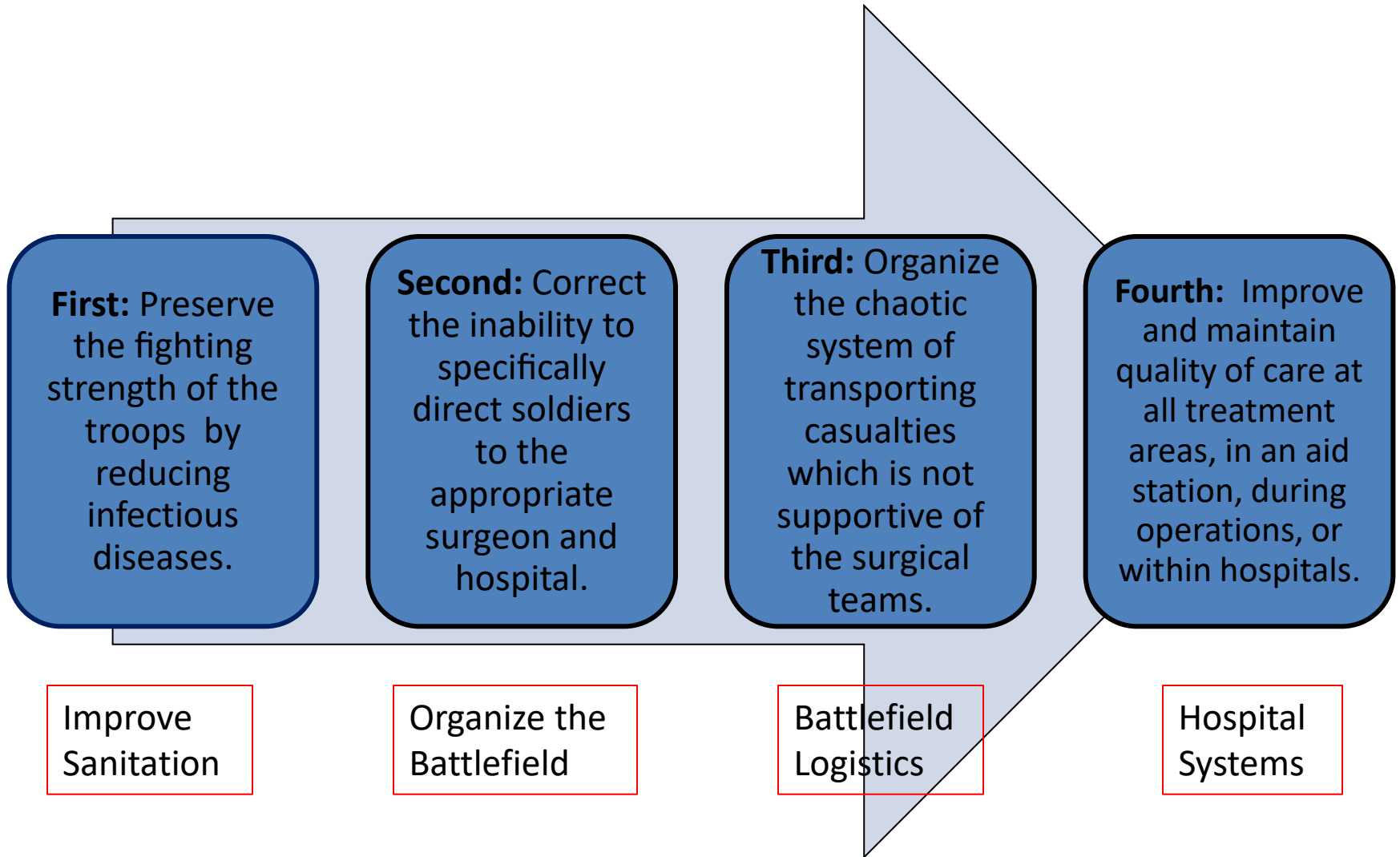
Maj. Jonathan Letterman

Orders for Personal & Unit Hygiene

- Required troops to bathe weekly in a river for at least 15 minutes, with soap!
- Pits were to be dug for latrines and six inches of fresh earth thrown into them each day.
- When filled within two feet of the surface, they were to be completely covered, and a new pit dug.
- Same approach is used for kitchen and animal waste.

Maj. Jonathan Letterman

Initial 4 Priorities



Maj. Jonathan Letterman

Ambulance Service

- Established a dedicated Ambulance Corps utilizing non-physician leaders, including a captain as Commandant.
- The hierarchy included 1 Lieutenant with responsibility over division ambulances, 2 Lieutenants responsible for Brigade ambulances, and Sergeants responsible for regimental ambulances.
- He incorporated parts of the French system of small, mobile, dedicated wagons directly supporting frontline units, and supplemented it with **committed stretcher bearers under the leadership of the Ambulance Corps.**

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Maj. Jonathan Letterman

Ambulance Service

- The Army of the Potomac received 200 new ambulances on September 12, 1862; 5 days before the battle of Antietam.
- Letterman's Ambulance plan proved its effectiveness as the field is entirely cleared of 12,410 casualties in less than 48 hours.
- Compare to the July 1861 Battle of Bull Run: Union Army suffered just 2,708 casualties, yet many wounded remain on the field for days while those still able are forced to walk the almost 30 miles back to Washington for treatment.

Civil War

Medical Care

- Each regiment was required to provide its own surgeon and there were no standards to qualify.
- Only Massachusetts required examination of regimental surgeons and many colonies did not provide the surgeons with a military rank.
- To make matters worse, the first director general of the Army Medical Corps, Dr. Benjamin Church, turned out to be a British spy.

Letterman

Levels of Medical Care

- A soldier wounded on the battlefield would be triaged by the medical staff.
- At the front line, a surgeon would identify soldiers with wounds considered lethal, list them as “killed in battle,” and then focus on those whose injuries were not considered mortal.
- Lethal injuries at the war’s onset included penetrating wounds to the abdomen, chest, and head, while treatable wounds were bullet wounds to the extremities and other less traumatic injuries.

Letterman

Levels of Medical Care

3-tiered hospital system put in place by Medical Director Jonathan Letterman in 1862:

- Soldiers with minimal injuries could be treated and remain attached to their regiment, where they could perform tasks such as assisting with the nursing of other soldiers, and ultimately return to combat.
- Those with treatable wounds were removed from the field once the battle had ended, provided with first aid at small field and regimental hospitals and then transported to more definitive care.
- The more severely wounded were transported in a timely manner to better equipped facilities.

Maj. Jonathan Letterman

Ambulance Service

- The well-structured ambulance system saved lives, supported the soldiers psychologically and helped keep them on the battlefield.
- Volunteer soldiers are more willing to stand and fight if they trust that they will receive prompt high-quality care if wounded or injured.
- The Confederacy did not implement any of Letterman's changes, did not use coordinated ambulances and made no significant health care system modifications throughout the war, so they did not achieve similar improvements in outcome.

Maj. Jonathan Letterman

Battle of Gettysburg

- With an additional 9 months to train the Ambulance Corps, the Medical Department was well prepared for the battle of Gettysburg.
- The Ambulance Corps evacuated 14,193 Union and 6,802 Confederate soldiers to Union hospitals that provided treatment for an amazing 20,995 men in 3 days.
- Despite the huge volume, not one wounded soldier remained on the battlefield the day after the battle ended.

Maj. Jonathan Letterman

Medical Kits

- Being an army surgeon he developed a list of the basic medical tools that were necessary to treat battlefield casualties.
- A standardized medical kit per physician was essential, along with a fully equipped medical wagon per brigade, to easily transport instruments, or replace them when needed.
- The medical kits contained various sizes and shapes of knives, scalpels, forceps, bistouries, curettes for scraping and cleaning, lancets for making punctures, tourniquets, bone saws, chain saws, sutures and bandages.

Civil War Surgeon's Kit



Maj. Jonathan Letterman

Medical Wagons

- Each medical wagon had 76 different medicines, dressings, medical books, and additional surgical instruments.
- They also had bedding, basins, vials, bedpans, basic food staples (hardtack and beef stock), kettles, plates, drinking vessels and spoons.
- When some officers and politicians complained about the extravagance of these supplies, Letterman said: “Lost supplies can be replaced, but lives lost are gone forever.”

Medical Wagon Drug Cabinet



Maj. Jonathan Letterman

Ambulance Service

- By 1864, Letterman's system is extended to the rest of the Union Army, with one ambulance wagon for every 150 Union combatants.
- Congress passed the Ambulance Corps Act of March 11, 1864.
- The law had strict prohibition against the use of ambulances for purposes other than the transportation of patients and emergency medical supplies.
- His system became the system of the American Army, and its thoroughness and practicality led many European armies to incorporate it into their medical systems within the next decade.

Maj. Jonathan Letterman

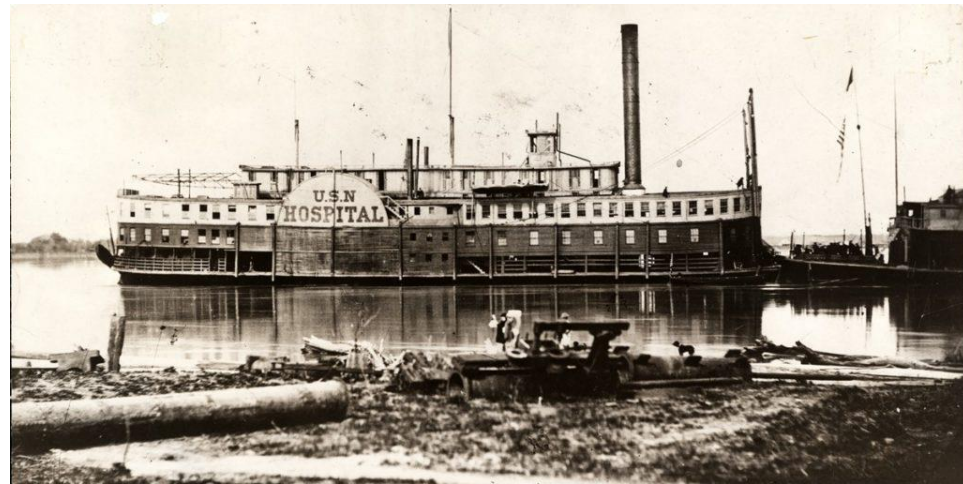
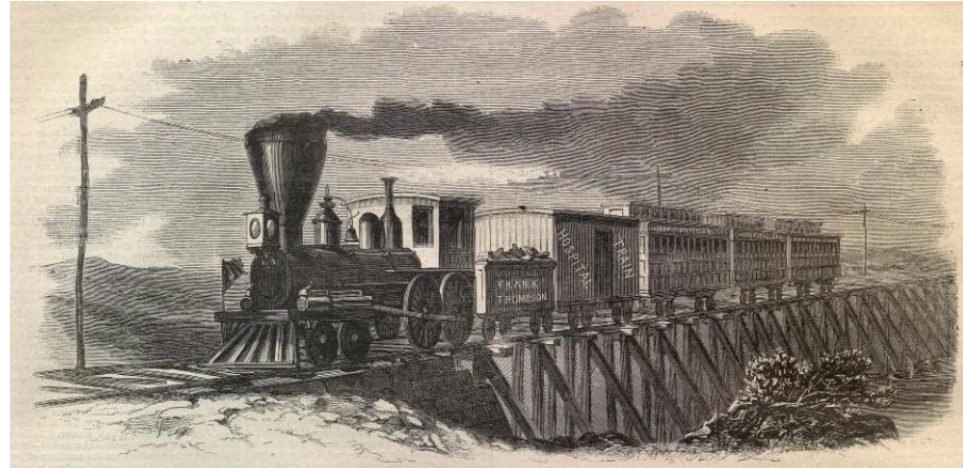
Ambulance Service

- The transportation of injured and ill soldiers went through many changes during the Civil War.
- An organized ambulance corps was developed to take soldiers to hospitals.
- Also used were Hospital trains and Steamers, known as sanitary steamers, to carry injured to general hospitals, because of their large capacity.

Civil War

Ambulance Service

- The transfer of patients was made possible by one of the war's greatest and most admired innovations—the ambulance system.
- Two other innovative and original designs in medical transportation emerged during the Civil War—the hospital train and the hospital boat.



Civil War

Anesthesia

- In 1846, the first record of using anesthesia was made, just 15 years before the Civil War.
- Anesthesia was used about 90 % of the time during surgeries such as amputations.
- The two most common types of anesthesia were chloroform and ether.

Civil War

(Anesthesia)

- Chloroform was used in about 75 % of Civil War surgeries.
- It was given to the patient by applying it to a cloth and draping it over the nose and mouth until unconscious (open drop technique).
- Ether was a combination of alcohol and sulfuric acid and was a common anesthetic during the war.
- At times, patients were not fully unconscious during their surgeries, they did not feel pain but were aware of what was going on.

Ether vs. Chloroform

Ether

- Highly flammable
- Easy to use
- Dosage with safe margin
- Delayed action
- Official US Army issue

Chloroform

- Non-flammable
- Skill needed
- Very narrow margin
- Fast-acting
- Available for Army use

Civil War

Medications

- Most medicines were manufactured in the north; southerners had to run the Union blockade in order to gain access to them.
- On occasion, vital medicines were smuggled into the South, sewn into the petticoats of ladies sympathetic to the Southern cause.
- The South also had some manufacturing capabilities and worked with herbal remedies, but many of the Southern medical supplies came from captured Union stores.
- Dr. Hunter McGuire, the medical director of Jackson's corps, commenting after the War on the safeness of anesthesia, said that the Confederacy's good record was due in part to the supplies requisitioned from the North.

Civil War

Medications

- A medication for the relief of pain was Dover's Powder, a mixture of ipecac and opium, but also alcohol (whiskey), was used as a pain-reliever, and was carried by medical personnel.
- Opium had many uses during the Civil War, to treat pain, severe diarrhea, pneumonia, and bronchitis.
- Cinchona bark (quinine) was used to treat common deadly diseases such as malaria.
- Calomel, used in the treatment of dysentery, was a powdered medication that contained mercury and was carried in paper pouches.

Civil War

Medical Care

- Hospitals of the period were feared by Union and Confederate soldiers.
- These soldiers tried hard to conceal the wounds or illnesses brought upon them in an attempt to avoid going to a hospital.
- Physicians did not understand that using unsterilized instruments on more than one soldier resulted in the spread of disease.
- Physicians were unaware of the relationship between water and typhoid, which proved to be so fatal that a regiment of 1,000 men was reduced to ½ before the regiment was sent into battle.

Civil War

(Medical Care)

- Most US doctors went through 2 to 3 years of medical school, plus apprenticeships.
- During the 1860's, doctors were universally ignorant of the causes of disease.
- Medicine in the US was sadly behind Europe.
- Harvard Medical School did not even own a single stethoscope or microscope until after the war.

Civil War

(Medical Care)

- Civil War doctors were:
 - underprepared
 - understaffed
 - underqualified
 - under-supplied
- Most Civil War surgeons had never treated a gunshot wound and many had never performed surgery.
- Medical boards admitted many "quacks," with little to no qualification.

Civil War

(Medical Care)

- 1860's Medicine had not adopted the use of sterile dressings, antiseptic surgery, nor recognized the importance of sanitation and hygiene.
- As a result, thousands died from diseases such as typhoid or dysentery.
- About 10K surgeons served in the Union Army and about 4K served in the Confederate Army.

Questions ? (2)



WEAPONS and AMMUNITION

Civil War Ammunition

Minié ball

- In the 1830's, British Captain John Norton of the British was serving in India.
- Local tribes used blowguns, and Norton observed that the base of their darts, made from pith, expanded when a person blew into the blowgun.
- This sealed the space between the tube and the dart, increasing the dart's speed, distance and power.

Civil War Ammunition

Minié ball

- Norton developed a cylindrical bullet with a hollow base in 1832; it was improved on in 1836 by a London gunsmith named William Greener.
- His conical bullet had a wooden plug, which upon firing, would expand to prevent gases from escaping—essentially the same principle as the blowgun dart.
- This was a precursor of the Minié ball.

Civil War Ammunition

Minié Ball

- In 1849, Claude-Etienne Minié designed a bullet that expanded when fired.
- The Minié bullet was cylindrical in shape, with a conical point and a hollow base containing an iron plug.
- It was smaller than the diameter of a rifle barrel, and could be easily loaded, even when the rifle became dirty.

Civil War Ammunition

Minié Ball

- The Minié ball was improved on by James Burton, an armorer at the U.S. Arsenal in Harpers Ferry, Virginia (now W. Virginia).
- Burton's version along with the rifled musket for firing it, was adopted for use by the U.S. Army by Secretary of War [Jefferson Davis, the future president of the Confederate States of America.](#)
- The Harpers Ferry rifle fired a .69 caliber while the Springfield design used .58 caliber.

Civil War Weapons

Minié ball

- New types of ammunition like the Minié ball, caused injuries with previously unseen damage .
- This slug crushed bone on impact and also destroyed 3 inches around the impact.
- Surgeons often felt removing a limb was the best way to save a life, leaving many soldiers without arms, legs, or feet.
- Gangrene also had a major role in the about the 50K amputations that took place over the course of the war.

Civil War Ammunition

(The Minié Ball)

- Upon firing, the powder expands the lead around base of the ball, making it fit tightly in the grooves of the rifle.
- The ball may be projected to large distances with great precision, and the effects are truly terrible:
 - Bones are ground almost to powder
 - Muscles, ligaments, and tendons are torn away
 - Severe mutilation inevitably causes loss of limb and/or life
- As it slowed down, the bullet flattened and destroyed whatever it came into contact with, leaving an exit wound substantially larger than its original entry point.

Civil War Ammunition

(The Minié Ball)



- Wounds from the conical Minié ball were different from those caused by the round balls from smoothbore muskets.
- Since the conical ball had a higher muzzle velocity and greater mass, it easily penetrated the human body.
- The Minié ball tended to cut a straight path and usually went all the way through the injured part; it seldom remained lodged in the body.
- If a Minié ball struck a bone, it usually shattered it.

Civil War Ammunition

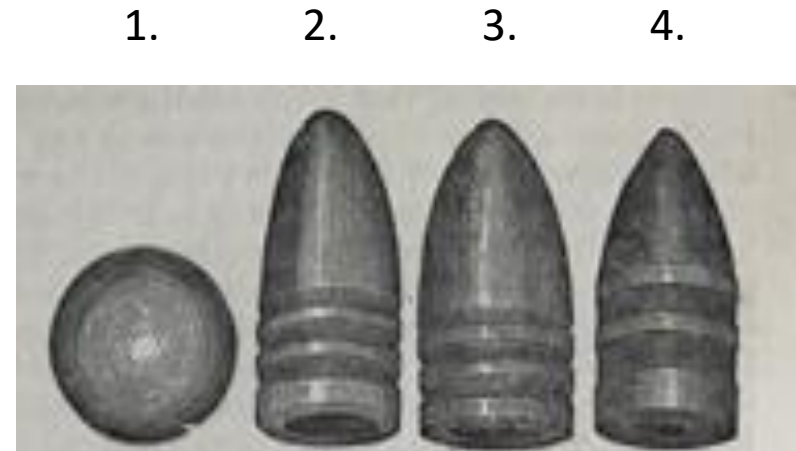
(The Minié Ball)

- Casualty figures for the American Civil War reached more than 200K soldiers killed and more than 400K wounded.
- The rifle-musket and the Minié bullet account for around 90 percent of these casualties.
- The Minie ball is estimated to have caused 100K deaths in the Civil War, both Confederate and Union soldiers
- The North produced 2 **Billion** deadly accurate and powerful Minié balls for the war.

Civil War Ammunition

The Minié Ball

- The ball was not round, but had a conical shape with grooves around the bottom.
- It was made of lead, softer than the iron that some other types of ammunition were made from.
- Lead was heavier but would not leave residue in the gun's barrel.



1. 50 cal round ball
2. 54 cal Minié ball
3. 69 cal Minié ball
4. 58 cal Confederate Minié ball

Civil War Ammunition

Minié ball

- The soft lead of the Minié ball caused it to flatten, shatter bones and destroy tissue in catastrophic ways.
- When a Minié ball entered the body, it could carry any foreign matter from the uniform, which increased the risk of infection.
- The Minié ball was responsible for a majority of combat casualties and amputations, and for 3 out of 4 operations performed at Civil War hospitals.

Civil War

(Amputations)

- At the start of the war, most surgeons were inexperienced with performing amputations, but they soon were doing many daily.
- There were 2 surgical methods, that were used when performing an amputation:
 - the *circular* method: faster and more convenient, allowed the surgeon to cut right through the limb and could be done even in dim lighting.
 - the *fish-mouth flap* method did not leave the amputated site open: the surgeon made a flap of skin that resembled the mouth of a fish and used it to cover the amputation site.

Civil War

Weapons

- The design of the firearm and ammunition greatly contributed to the type and size of injury sustained.
- Smoothbore firearms shot spherical lead ammunition that caused damage, but its bullets went straight in and out of limbs leaving an exit wound that was nearly the same size as its entry.
- It could break a bone or damage soft tissue, but the injury, though painful and easily prone to infection, could be managed.

Civil War Weapons

(Rifling)



- Rifling means that spiral grooves are cut into the inside of a gun's barrel.
- It causes the bullet to spin as it flies through the air and greatly improves its accuracy over longer distances.
- The first muskets to use this technology were called rifles.

Civil War Weapons

Muskets

- The range of the rifled musket was 300-900 yards, whereas the range of a smoothbore musket was only 50 to 200 yards.
- Both weapons were the most effective in the same range of about 100 yards.
- Gangrenous wounds often spelled a death sentence for many men.

Civil War Weapons

(Smoothbore vs Rifled)

- Northern factories made the new rifles at a very high rate compared with the less-industrialized South.
- At extremely close ranges, the smoothbore could be loaded with "buck and ball," the 69-caliber ball and two smaller ones ("buckshot"), so that every shot sent three bullets spinning toward the enemy.
- Since troops armed with rifled muskets could stand off and fire from a greater distance, this smoothbore advantage only occurred during close-quarters fighting.

Civil War Ammunition

(Round Musket Balls)

- Round balls tended to remain lodged in the flesh, and could take a winding path through the body.
- Flexed muscles and tendons, as well as bone, could cause the round ball to deviate from a straight path.
- The damage to bones and resulting compound fractures were usually severe enough to necessitate amputation.
- A hit on a major blood vessel could have fatal outcomes.

Civil War

(Weapons)

- Calibers:
 - 0.54 Enfield Carbine
 - 0.58 Springfield Rifle
 - 0.69 Harpers Ferry Rifle
- When the Civil War broke out in 1861, most state arsenals contained smoothbore muskets, so these were used out of necessity.

WOMEN in the CIVIL WAR

Women in the Civil War

- 3,200+ women served as paid nurses (\$12/month) in the Union and Confederate armies, and thousands more served as volunteers in hospitals, in support organizations and on the battlefields.
- The most significant of these organizations was the Sanitary Commission, which was staffed primarily by women, and had a tremendous impact on the state of healthcare during the war.
- Inspired by the British Sanitary Commission this was praised as “the most powerful organization for lessening the horrors and reducing the losses of war which mankind has thus far produced.”

Women in the Civil War

(Nurses)



Women in the Civil War



- Most nurses of the Civil War were Sisters from religious orders.
- Nurses were asked to wear brown or black dress, but often they wore trousers.



- The dress had no any ornaments or frills and no hoop skirts.
- There were no distinguishing insignias, as nurses had no official rank.

Questions ?

(Final)





Thank
you

Next Week

- Session 1: Ancient history, Rome, Greece.
- Session 2: Middle Ages, weapons & injuries.
- Session 3: US Revolutionary & Civil Wars.
- **Session 4: World War I.**
- **Session 5: World War II.**
- **Session 6: Korea, Vietnam.**
- **Session 7: 20th & 21st Century Regional wars.**
- **Session 8: Peek into future, Nuclear War?**